

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TOSHIBA CORP

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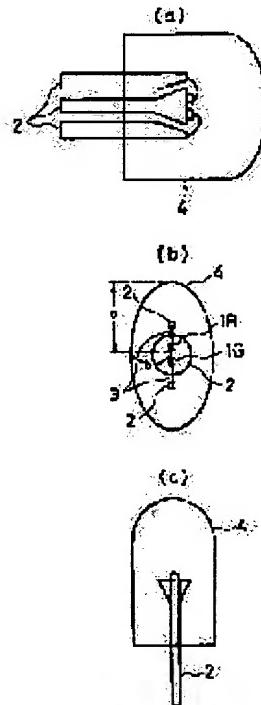
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FUJIMURA NORIO  
TANAKA TOSHIAKI

## (54) LED LAMP

### (57)Abstract:

PURPOSE: To provide a multicolor luminescence LED with an excellent color mixing property and high luminance.

CONSTITUTION: The title lamp consists of the following; a plurality of semiconductor light emitting elements 1R and 1G which emit at least two or more colors, a lead frame which mounts a plurality of the semiconductor light emitting elements 1R and 1G, and an optically transparent sealing resin capsule 4 which encloses a plurality of the semiconductor light emitting elements 1R and 1G. The curvature of the sealing resin capsule 4 is smaller in the direction parallel with the arrangement of a plurality of the semiconductor light emitting elements 1R and 1G than in the direction vertical to the arrangement.



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L5: Entry 1 of 1

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Nov 24, 1998

DERWENT-ACC-NO: 1995-086994

DERWENT-WEEK: 199903

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TITLE: LED lamp for high luminous intensity multi-colour light emission - has two or three semiconductor elements sealed inside transparent resin material whose curvature in parallel direction to these elements is smaller than that in perpendicular direction

INVENTOR: FUJIMURA, N; KOMOTO, S ; TANAKA, T

## PATENT-ASSIGNEE:

ASSIGNEE	CODE
TOSHIBA KK	TOKE

PRIORITY-DATA: 1993JP-0155177 (June 25, 1993)

## PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 5841177 A	November 24, 1998		000	H01L027/14
JP 07015043 A	January 17, 1995		005	H01L033/00
CN 1102467 A	May 10, 1995		000	F21Q003/00

## APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
US 5841177A	June 23, 1994	1994US-0264365	Cont of
US 5841177A	September 8, 1995	1995US-0525071	Cont of
US 5841177A	July 10, 1997	1997US-0890927	
JP07015043A	June 25, 1993	<u>1993JP-0155177</u>	
CN 1102467A	June 24, 1994	1994CN-0108913	

INT-CL (IPC): F21 Q 3/00; H01 L 27/14; H01 L 27/15; H01 L 31/00; H01 L 33/00

ABSTRACTED-PUB-NO: JP07015043A

## BASIC-ABSTRACT:

The LED lamp has a lead frame (2) which positions multi colour light emitting semiconductor elements (1R,1G,1B). The arrangement of these elements is enclosed in a sealing resin (4) which is transparent.

The shape of the transparent sealing resin is such that its curvature in a direction parallel to the row of LED elements is smaller than its curvature in perpendicular direction.

ADVANTAGE - Provides multi-colour light emission of high colour mixture characteristics. Obtains high luminous intensity.

ABSTRACTED-PUB-NO:

US 5841177A

EQUIVALENT-ABSTRACTS:

The LED lamp has a lead frame (2) which positions multi colour light emitting semiconductor elements (1R, 1G, 1B). The arrangement of these elements is enclosed in a sealing resin (4) which is transparent.

The shape of the transparent sealing resin is such that its curvature in a direction parallel to the row of LED elements is smaller than its curvature in perpendicular direction.

ADVANTAGE - Provides multi-colour light emission of high colour mixture characteristics. Obtains high luminous intensity.

CHOSEN-DRAWING: Dwg.1/5

TITLE-TERMS: LED LAMP HIGH LUMINOUS INTENSITY MULTI COLOUR LIGHT EMIT TWO THREE SEMICONDUCTOR ELEMENT SEAL TRANSPARENT RESIN MATERIAL CURVE PARALLEL DIRECTION ELEMENT SMALLER PERPENDICULAR DIRECTION

DERWENT-CLASS: Q71 U12 X26

EPI-CODES: U12-A01A4; X26-H;

SECONDARY-ACC-NO:

Non-CPI Secondary Accession Numbers: N1995-068572

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**CLAIMS**

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[Claim]

[Claim 1] It is Light Emitting Diode lamp with which it is characterized by having the leadframe which lays two or more semiconductor light emitting devices which emit light in at least two or more colors, and two or more aforementioned semiconductor light emitting devices, and the \*\*\*\* resin appearance of the light-transmission nature which encloses two or more aforementioned semiconductor light emitting devices, and the aforementioned \*\*\*\* resin appearance having parallel curvature smaller than vertical curvature to the list of two or more aforementioned semiconductor light emitting devices.

[Claim 2] The aforementioned \*\*\*\* resin appearance is Light Emitting Diode lamp given in the claim 1 which is a configuration containing a part of ellipsoid or ellipsoid, and is characterized by the major axes of this ellipsoid being abbreviation parallel to the list of two or more aforementioned semiconductor light emitting devices.

[Claim 3] Two or more aforementioned semiconductor light emitting devices are Light Emitting Diode lamps given in the claims 1 or 2 characterized by having three or more semiconductor light emitting devices containing the semiconductor light emitting device of red photogenesis, green photogenesis, and blue photogenesis.

[Claim 4] The aforementioned \*\*\*\* resin appearance is Light Emitting Diode lamp given in the claims 1, 2, or 3 characterized by the ratio of the parallel path to a vertical path being 1.2 or more to the list of two or more aforementioned semiconductor light emitting devices.

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## DETAILED DESCRIPTION

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[Detailed description]

[0001]

[Field of the Invention] About Light Emitting Diode lamp of multicolor photogenesis, especially this invention is equipped with high color mixture nature, and relates to Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity.

[0002]

[Prior art] The resin appearance 14 in which Light Emitting Diode lamp by the conventional technique \*\*\*\*'s two or more light emitting devices 1R and 1G as shown in drawing 4 has that common from which curvature is constituted from a parallel direction and a perpendicular direction by equal body of revolution to the list of light emitting devices 1R and 1G (the 1st conventional example).

[0003] In the case of Light Emitting Diode lamp equipped with such an appearance configuration, the light emitted from light emitting devices 1R and 1G is taken out in the separate orientation by the lens effect which the \*\*\*\* resin appearance 14 has respectively. This is a phenomenon produced since the installation positions of light emitting devices 1R and 1G differ mutually, and it is physically difficult to completely take out the photogenesis from each light emitting devices 1R and 1G in the same orientation.

[0004] For this reason, with Light Emitting Diode lamp of the 1st conventional example, the light of the different luminescent color taken out from light emitting devices 1R and 1G is respectively emitted in the individual orientation, and had produced the fault of spoiling remarkably the color mixture nature of Light Emitting Diode lamp.

[0005] There is a Light Emitting Diode lamp (the 2nd conventional example) equipped with the structure which is shown in drawing 5 as one of the means which improve the problem of this color mixture nature. This improves color mixture nature by increasing the color mixture field of the light emitted from each light emitting devices 1R and 1G by making the curvature of the \*\*\*\* resin appearance 24 small, and making small the azimuth dependency of the luminous-intensity distribution taken out.

[0006] However, since the lens effect by the \*\*\*\* resin appearance 24 became small in the case of the 2nd conventional example equipped with such an appearance configuration, the luminous intensity taken out in the orientation of a transverse plane fell, and the fault that an intensity required as a result was not obtained had been produced.

[0007]

[Object of the Invention] As mentioned above, with Light Emitting Diode lamp of the conventional multicolor photogenesis, since the installation positions of two or more light emitting devices differed mutually, the different luminescent color taken out from each light emitting device is respectively emitted in the individual orientation, and had the problem spoil remarkably the color mixture nature of Light Emitting Diode lamp.

[0008] Moreover, since the lens effect by the \*\*\*\* resin appearance became small when the azimuth dependency of the luminous-intensity distribution which makes the curvature of a \*\*\*\* resin appearance small and is taken out is made small, in order to improve the problem of this color mixture nature, the luminous intensity taken out in the orientation of a transverse plane fell, and there was a problem that a required intensity was not obtained.

[0009] It is this invention's solving the above-mentioned trouble, and the purpose's being equipped with high color mixture nature, and offering Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity.

[0010]

[The means for solving a technical problem] In order to solve the aforementioned technical problem, the 1st characteristic feature of this invention Two or more semiconductor light emitting devices 1R and 1G which emit light in at least two or more colors as shown in drawing 1, The leadframe 2 which lays two or more aforementioned semiconductor light emitting devices 1R and 1G, The \*\*\*\* resin appearance 4 of the light-transmission nature which encloses two or more aforementioned semiconductor light emitting devices 1R and 1G is provided, and the aforementioned \*\*\*\* resin appearance 4 is that parallel curvature is smaller than vertical curvature to the list of two or more aforementioned semiconductor light emitting devices 1R and 1G.

[0011] Moreover, the 2nd characteristic feature of this invention is the configuration in which the aforementioned \*\*\*\* resin appearance 4 contains a part of ellipsoid or ellipsoid in Light Emitting Diode lamp given in a claim 1, and the major axis of this ellipsoid is [ abbreviation ] to the list of two or more aforementioned semiconductor light emitting devices 1R and 1G.

[0012] Moreover, it is having three or more semiconductor light emitting devices 1R, 1G, and 1B in which the 3rd characteristic feature of this invention contains the semiconductor light emitting device of red photogenesis, green photogenesis, and blue photogenesis as two or more aforementioned semiconductor light emitting devices' are shown in drawing 2 in Light Emitting Diode lamp given in claims 1 or 2.

[0013] Furthermore, in Light Emitting Diode lamp given in claims 1, 2, or 3, the ratio of the semiconductor light emitting devices 1R and 1G of the aforementioned plurality [ appearance / \*\*\*\* resin / aforementioned ] and parallel path a / as opposed to / reach or / vertical path b to the list of 1B / of the 4th characteristic feature of this invention is 1.2 or more.

[0014]

[Operation] With Light Emitting Diode lamp of the characteristic feature of this invention, it has two or more semiconductor light emitting devices 1R and 1G which emit light in at least 2 colors or three colors or more, or 1R, 1G and 1B. the \*\*\*\* resin appearance 4 in for example, the configuration containing a part of ellipsoid or ellipsoid And to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B, as the major axis of this ellipsoid becomes [ abbreviation ], parallel curvature is made to become smaller than vertical curvature to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B.

[0015] Since the curvature of the \*\*\*\* resin appearance 4 is small relatively by this to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B if parallel The azimuth dependency of the luminous-intensity distribution taken out can be made small, and since the curvature of the \*\*\*\* resin appearance 4 is large relatively on the other hand if perpendicular, required luminous intensity can be obtained, without reducing the convergence operation by the lens effect of the \*\*\*\* resin appearance 4 so much. As a result, it has high color mixture nature, and Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity can be realized.

[0016] In addition, when the \*\*\*\* resin appearance 4 makes the ratio of parallel path a to vertical path b 1.2 or more to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B, the above-mentioned effect appears notably.

[0017]

[Example] Hereafter, the example concerning this invention is explained based on a drawing.

[0018] The block diagram of Light Emitting Diode lamp applied to the 1st example of this invention at drawing 1 is shown. \*\* which gives the same sign to the fraction which overlaps drawing 4 and drawing 5 (the conventional example) in this drawing. In addition, the side elevation of the orientation of a minor axis of the ellipse which is the cross-section configuration which shows drawing 1 (b) in the cross section of the orientation of a transverse plane, and shows drawing 1 (a) to drawing 1 (b), and drawing 1 (c) are the side elevations of the orientation of a major axis of the ellipse which is the cross-section configuration shown in drawing 1 (b).

[0019] In drawing 1 , Light Emitting Diode lamp of this example is equipped with the \*\*\*\* resin appearance 4 of semiconductor light-emitting-device 1G which emit light in semiconductor light-emitting-device 1R which emits light in red, and green, the leadframe 2 which lays the semiconductor light emitting devices 1R and 1G, and the light-transmission nature which encloses the semiconductor light emitting devices 1R and 1G, and connection of the semiconductor light emitting devices 1R and 1G and the leadframe 2 is carried out by the golden wire 3.

[0020] Light Emitting Diode lamp of this example is produced as follows.

[0021] First, respectively, a conductive epoxy resin is used, and it lays, and fixes on a leadframe 2, and connection of the two semiconductor light emitting devices 1R and 1G is carried out with the golden wire 3. Here, as two semiconductor light emitting devices 1R and 1G, green semiconductor light-emitting-device 1G, such as red semiconductor light-emitting-device 1R, such as GaAlAs or GaAsP, and GaP or InGaAlP, are used, for example.

[0022] Then, after pouring in a liquefied transparent epoxy resin into the fixture for mold and fully inserting the element installation section of a leadframe 2 into a transparent epoxy resin, a transparent epoxy resin is made to heat-harden. At this time, the \*\*\*\* resin appearance 4 of the configuration containing a part of ellipsoid or ellipsoid can be fabricated by producing the wall configuration of the fixture for mold in the shape of an ellipsoid etc.

[0023] The \*\* type of the \*\*\*\* resin appearance 4 hardened from the mold fixture is carried out, the leadframe 2 which connected in order to make a manufacture easy is cut in a predetermined configuration, and the last is made to complete Light Emitting Diode lamp.

[0024] The graph which shows the effect of a color mixture nature improvement of Light Emitting Diode lamp of this example to drawing 3 (a) explains. Drawing 3 (a) shows the color mixture field (inside of drawing, property A) to the aspect ratio of this example, the transverse-plane luminous intensity (inside of drawing, property B) to the aspect ratio of this example, and the transverse-plane intensity (inside of drawing, property C) to the conventional aspect ratio, respectively.

[0025] In addition, the aspect ratios of this example are semimajor-axes a / semiminor-axes b in the ellipse which becomes the ratio of the parallel curvature of the \*\*\*\* resin appearance 4 to the list of the semiconductor light emitting devices 1R and 1G, and the curvature of the vertical \*\*\*\* resin appearance 4, i.e., the cross-section configuration shown in drawing 1 (a). The aspect ratio of the 2nd conventional example is a/b in the path (long half shaft) of a circle when making equal the long half shaft of the ellipse used as the cross-section configuration shown in the path and drawing 1 (a) of the circle used as the cross-section configuration shown in drawing 5 (b) and the ratio of a semiminor axes, i.e., drawing 5 , (a).

[0026] Moreover, the color mixture field defines the photogenesis field of semiconductor light-emitting-device 1R by the size of angle [ of the color mixture field (field whose two colors are visible to color mixture) 6 formed in them when 5R and the photogenesis field of semiconductor light-emitting-device 1G are set to 5G ] theta [\*\*], as shown in drawing 3 (b).

[0027] In drawing 3 (a), from property A which shows a color mixture field, a mode that the color mixture fields 6 increase in number sharply can understand clearly as an aspect ratio becomes large. When it carries out to more than aspect ratio = 1.2 especially, it turns out that nearly completely near color mixture nature is shown.

[0028] Moreover, from property B which shows transverse-plane luminous intensity, and property C, Light Emitting Diode lamp of this example understands that there is the large improvement effect as compared with the spherical \*\*\*\* resin appearance (the 2nd conventional example) with curvature equal to the long half shaft of an ellipse in this example.

[0029] Next, the block diagram of Light Emitting Diode lamp applied to the 2nd example of this invention at drawing 2 is shown.

[0030] It is the side elevation of the orientation of a minor axis of the ellipse which is the cross-section configuration which shows drawing 2 (b) in the cross section of the orientation of a transverse plane, and shows drawing 2 (a) to drawing 2 (b). In addition, about the side elevation of the orientation of a major axis of the ellipse which is the cross-section configuration shown in drawing 2 (b), it is the same as that of drawing 1 (c).

[0031] Semiconductor light-emitting-device 1R to which Light Emitting Diode lamp of this example emits light in red in drawing 2, Semiconductor light-emitting-device 1G which emit light in green, semiconductor light-emitting-device 1B which emits light in blue, It has the \*\*\*\* resin appearance 4 of the leadframe 2 which lays the semiconductor light emitting devices 1R, 1G, and 1B, and the light-transmission nature which encloses the semiconductor light emitting devices 1R, 1G, and 1B, and connection of the semiconductor light emitting devices 1R, 1G, and 1B and the leadframe 2 is carried out by the golden wire 3.

[0032] As semiconductor light emitting devices 1R, 1G, and 1B, blue semiconductor light-emitting-device 1B, such as green semiconductor light-emitting-device 1G, such as red semiconductor light-emitting-device 1R, such as GaAlAs or GaAsP, and GaP or InGaAlP, and SiC, is used, for example.

[0033] About the production technique and the property, it is the same as that of the 1st example.

[0034]

[Effect of the invention] According to this invention, it has two or more semiconductor light emitting devices which emit light in at least 2 colors or three colors or more as mentioned above. a \*\*\*\* resin appearance in for example, the configuration containing a part of ellipsoid or ellipsoid And since parallel curvature becomes smaller than vertical curvature to the list of two or more semiconductor light emitting devices as the major axis of this ellipsoid serves as abbreviation parallel to the list of two or more semiconductor light emitting devices To the list of two or more semiconductor light emitting devices, if parallel, the curvature of a \*\*\*\* resin appearance becomes small relatively. The azimuth dependency of the luminous-intensity distribution taken out can be made small, and since the curvature of a \*\*\*\* resin appearance becomes large relatively on the other hand if perpendicular, required luminous intensity can be obtained, without reducing the convergence operation by the lens effect of a \*\*\*\* resin appearance so much. As a result, it can have high color mixture nature, and Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity can be offered.

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**TECHNICAL FIELD**

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[Field of the Invention] About Light Emitting Diode lamp of multicolor photogenesis, especially this invention is equipped with high color mixture nature, and relates to Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity.

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PRIOR ART

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[Prior art] The resin appearance 14 in which Light Emitting Diode lamp by the conventional technique \*\*\*\*'s two or more light emitting devices 1R and 1G as shown in drawing 4 has that common from which curvature is constituted from a parallel direction and a perpendicular direction by equal body of revolution to the list of light emitting devices 1R and 1G (the 1st conventional example).

[0003] In the case of Light Emitting Diode lamp equipped with such an appearance configuration, the light emitted from light emitting devices 1R and 1G is taken out in the separate orientation by the lens effect which the \*\*\*\* resin appearance 14 has respectively. This is a phenomenon produced since the installation positions of light emitting devices 1R and 1G differ mutually, and it is physically difficult to completely take out the photogenesis from each light emitting devices 1R and 1G in the same orientation.

[0004] For this reason, with Light Emitting Diode lamp of the 1st conventional example, the light of the different luminescent color taken out from light emitting devices 1R and 1G is respectively emitted in the individual orientation, and had produced the fault of spoiling remarkably the color mixture nature of Light Emitting Diode lamp.

[0005] There is a Light Emitting Diode lamp (the 2nd conventional example) equipped with the structure which is shown in drawing 5 as one of the means which improve the problem of this color mixture nature. This improves color mixture nature by increasing the color mixture field of the light emitted from each light emitting devices 1R and 1G by making the curvature of the \*\*\*\* resin appearance 24 small, and making small the azimuth dependency of the luminous-intensity distribution taken out.

[0006] However, since the lens effect by the \*\*\*\* resin appearance 24 became small in the case of the 2nd conventional example equipped with such an appearance configuration, the luminous intensity taken out in the orientation of a transverse plane fell, and the fault that an intensity required as a result was not obtained had been produced.

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EFFECT OF THE INVENTION

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[Effect of the invention] According to this invention, it has two or more semiconductor light emitting devices which emit light in at least 2 colors or three colors or more as mentioned above. a \*\*\*\* resin appearance in for example, the configuration containing a part of ellipsoid or ellipsoid And since parallel curvature becomes smaller than vertical curvature to the list of two or more semiconductor light emitting devices as the major axis of this ellipsoid serves as abbreviation parallel to the list of two or more semiconductor light emitting devices To the list of two or more semiconductor light emitting devices, if parallel, the curvature of a \*\*\*\* resin appearance becomes small relatively. The azimuth dependency of the luminous-intensity distribution taken out can be made small, and since the curvature of a \*\*\*\* resin appearance becomes large relatively on the other hand if perpendicular, required luminous intensity can be obtained, without reducing the convergence operation by the lens effect of a \*\*\*\* resin appearance so much. As a result, it can have high color mixture nature, and Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity can be offered.

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**TECHNICAL PROBLEM**

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[Object of the Invention] As mentioned above, with Light Emitting Diode lamp of the conventional multicolor photogenesis, since the installation positions of two or more light emitting devices differed mutually, the different luminescent color taken out from each light emitting device is respectively emitted in the individual orientation, and had the problem spoil remarkably the color mixture nature of Light Emitting Diode lamp.

[0008] Moreover, since the lens effect by the \*\*\*\* resin appearance became small when the azimuth dependency of the luminous-intensity distribution which makes the curvature of a \*\*\*\* resin appearance small and is taken out is made small, in order to improve the problem of this color mixture nature, the luminous intensity taken out in the orientation of a transverse plane fell, and there was a problem that a required intensity was not obtained.

[0009] It is this invention's solving the above-mentioned trouble, and the purpose's being equipped with high color mixture nature, and offering Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity.

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MEANS

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[The means for solving a technical problem] In order to solve the aforementioned technical problem, the 1st characteristic feature of this invention Two or more semiconductor light emitting devices 1R and 1G which emit light in at least two or more colors as shown in drawing 1, The leadframe 2 which lays two or more aforementioned semiconductor light emitting devices 1R and 1G, The \*\*\*\* resin appearance 4 of the light-transmission nature which encloses two or more aforementioned semiconductor light emitting devices 1R and 1G is provided, and the aforementioned \*\*\*\* resin appearance 4 is that parallel curvature is smaller than vertical curvature to the list of two or more aforementioned semiconductor light emitting devices 1R and 1G.

[0011] Moreover, the 2nd characteristic feature of this invention is the configuration in which the aforementioned \*\*\*\* resin appearance 4 contains a part of ellipsoid or ellipsoid in Light Emitting Diode lamp given in a claim 1, and the major axis of this ellipsoid is [ abbreviation ] to the list of two or more aforementioned semiconductor light emitting devices 1R and 1G.

[0012] Moreover, it is having three or more semiconductor light emitting devices 1R, 1G, and 1B in which the 3rd characteristic feature of this invention contains the semiconductor light emitting device of red photogenesis, green photogenesis, and blue photogenesis as two or more aforementioned semiconductor light emitting devices' are shown in drawing 2 in Light Emitting Diode lamp given in claims 1 or 2.

[0013] Furthermore, in Light Emitting Diode lamp given in claims 1, 2, or 3, the ratio of the semiconductor light emitting devices 1R and 1G of the aforementioned plurality [ appearance / \*\*\*\* resin / aforementioned ] and parallel path a / as opposed to / reach or / vertical path b to the list of 1B / of the 4th characteristic feature of this invention is 1.2 or more.

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## OPERATION

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[Operation] With Light Emitting Diode lamp of the characteristic feature of this invention, it has two or more semiconductor light emitting devices 1R and 1G which emit light in at least 2 colors or three colors or more, or 1R, 1G and 1B. the \*\*\*\* resin appearance 4 in for example, the configuration containing a part of ellipsoid or ellipsoid And to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B, as the major axis of this ellipsoid becomes [ abbreviation ], parallel curvature is made to become smaller than vertical curvature to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B.

[0015] Since the curvature of the \*\*\*\* resin appearance 4 is small relatively by this to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B if parallel The azimuth dependency of the luminous-intensity distribution taken out can be made small, and since the curvature of the \*\*\*\* resin appearance 4 is large relatively on the other hand if perpendicular, required luminous intensity can be obtained, without reducing the convergence operation by the lens effect of the \*\*\*\* resin appearance 4 so much. As a result, it has high color mixture nature, and Light Emitting Diode lamp of multicolor photogenesis of high luminous intensity can be realized.

[0016] In addition, when the \*\*\*\* resin appearance 4 makes the ratio of parallel path a to vertical path b 1.2 or more to the list of two or more semiconductor light emitting devices 1R, 1G, and 1B, the above-mentioned effect appears notably.

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EXAMPLE

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[Example] Hereafter, the example concerning this invention is explained based on a drawing.

[0018] The block diagram of Light Emitting Diode lamp applied to the 1st example of this invention at drawing 1 is shown. \*\* which gives the same sign to the fraction which overlaps drawing 4 and drawing 5 (the conventional example) in this drawing. In addition, the side elevation of the orientation of a minor axis of the ellipse which is the cross-section configuration which shows drawing 1 (b) in the cross section of the orientation of a transverse plane, and shows drawing 1 (a) to drawing 1 (b), and drawing 1 (c) are the side elevations of the orientation of a major axis of the ellipse which is the cross-section configuration shown in drawing 1 (b).

[0019] In drawing 1, Light Emitting Diode lamp of this example is equipped with the \*\*\*\* resin appearance 4 of semiconductor light-emitting-device 1G which emit light in semiconductor light-emitting-device 1R which emits light in red, and green, the leadframe 2 which lays the semiconductor light emitting devices 1R and 1G, and the light-transmission nature which encloses the semiconductor light emitting devices 1R and 1G, and connection of the semiconductor light emitting devices 1R and 1G and the leadframe 2 is carried out by the golden wire 3.

[0020] Light Emitting Diode lamp of this example is produced as follows.

[0021] First, respectively, a conductive epoxy resin is used, and it lays, and fixes on a leadframe 2, and connection of the two semiconductor light emitting devices 1R and 1G is carried out with the golden wire 3. Here, as two semiconductor light emitting devices 1R and 1G, green semiconductor light-emitting-device 1G, such as red semiconductor light-emitting-device 1R, such as GaAlAs or GaAsP, and GaP or InGaAlP, are used, for example.

[0022] Then, after pouring in a liquefied transparent epoxy resin into the fixture for mold and fully inserting the element installation section of a leadframe 2 into a transparent epoxy resin, a transparent epoxy resin is made to heat-harden. At this time, the \*\*\*\* resin appearance 4 of the configuration containing a part of ellipsoid or ellipsoid can be fabricated by producing the wall configuration of the fixture for mold in the shape of an ellipsoid etc.

[0023] The \*\* type of the \*\*\*\* resin appearance 4 hardened from the mold fixture is carried out, the leadframe 2 which connected in order to make a manufacture easy is cut in a predetermined configuration, and the last is made to complete Light Emitting Diode lamp.

[0024] The graph which shows the effect of a color mixture nature improvement of Light Emitting Diode lamp of this example to drawing 3 (a) explains. Drawing 3 (a) shows the color mixture field (inside of drawing, property A) to the aspect ratio of this example, the transverse-plane luminous intensity (inside of drawing, property B) to the aspect ratio of this example, and the transverse-plane intensity (inside of drawing, property C) to the conventional aspect ratio, respectively.

[0025] In addition, the aspect ratios of this example are semimajor-axes a / semiminor-axes b in the ellipse which becomes the ratio of the parallel curvature of the \*\*\*\* resin appearance 4 to the list of the semiconductor light emitting devices 1R and 1G, and the curvature of the vertical \*\*\*\* resin appearance 4, i.e., the cross-section configuration shown in drawing 1 (a). The aspect ratio of the 2nd conventional example is a/b in the path (long half shaft) of a circle when making equal the long half shaft of the ellipse used as the cross-section configuration shown in the path and drawing 1 (a) of the circle used as the cross-section configuration shown in drawing 5 (b) and the ratio of a semiminor axes, i.e., drawing 5 , (a).

[0026] Moreover, the color mixture field defines the photogenesis field of semiconductor light-emitting-device 1R by the size of angle [ of the color mixture field (field whose two colors are visible to color mixture) 6 formed in them when 5R and the photogenesis field of semiconductor light-emitting-device 1G are set to 5G ] theta [\*\*], as shown in drawing 3 (b).

[0027] In drawing 3 (a), from property A which shows a color mixture field, a mode that the color mixture fields 6 increase in number sharply can understand clearly as an aspect ratio becomes large. When it carries out to more than aspect ratio =1.2 especially, it turns out that nearly completely near color mixture nature is shown.

[0028] Moreover, from property B which shows transverse-plane luminous intensity, and property C, Light Emitting Diode lamp of this example understands that there is the large improvement effect as compared with the spherical \*\*\*\* resin appearance (the 2nd conventional example) with curvature equal to the long half shaft of an ellipse in this example.

[0029] Next, the block diagram of Light Emitting Diode lamp applied to the 2nd example of this invention at drawing 2 is shown.

[0030] It is the side elevation of the orientation of a minor axis of the ellipse which is the cross-section configuration which shows drawing 2 (b) in the cross section of the orientation of a transverse plane, and shows drawing 2 (a) to drawing 2 (b). In addition, about the side elevation of the orientation of a major axis of the ellipse which is the cross-section configuration

shown in drawing 2 (b), it is the same as that of drawing 1 (c).

[0031] Semiconductor light-emitting-device 1R to which Light Emitting Diode lamp of this example emits light in red in drawing 2, Semiconductor light-emitting-device 1G which emit light in green, semiconductor light-emitting-device 1B which emits light in blue, It has the \*\*\*\* resin appearance 4 of the leadframe 2 which lays the semiconductor light emitting devices 1R, 1G, and 1B, and the light-transmission nature which encloses the semiconductor light emitting devices 1R, 1G, and 1B, and connection of the semiconductor light emitting devices 1R, 1G, and 1B and the leadframe 2 is carried out by the golden wire 3.

[0032] As semiconductor light emitting devices 1R, 1G, and 1B, blue semiconductor light-emitting-device 1B, such as green semiconductor light-emitting-device 1G, such as red semiconductor light-emitting-device 1R, such as GaAlAs or GaAsP, and GaP or InGaAlP, and SiC, is used, for example.

[0033] About the production technique and the property, it is the same as that of the 1st example.

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[Translation done.]

\* NOTICES \*

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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[An easy explanation of a drawing]

[Drawing 1] The side elevation of the orientation of a minor axis of the ellipse which it is the block diagram of Light Emitting Diode lamp concerning the 1st example of this invention, and is the cross-section configuration which shows drawing 1 (b) in the cross section of the orientation of a transverse plane, and shows drawing 1 (a) to drawing 1 (b), and drawing 1 (c) are the side elevations of the orientation of a major axis of the ellipse which is the cross-section configuration shown in drawing 1 (b).

[Drawing 2] It is the side elevation of the orientation of a minor axis of the ellipse which it is the block diagram of Light Emitting Diode lamp concerning the 2nd example of this invention, and is the cross-section configuration which shows drawing 2 (b) in the cross section of the orientation of a transverse plane, and shows drawing 2 (a) to drawing 2 (b).

[Drawing 3] Drawing 3 (a) is property explanatory drawing showing the effect of a color mixture nature improvement of Light Emitting Diode lamp of the 1st example, and transverse-plane luminous intensity and property C are a transverse-plane intensity to the aspect ratio of the 2nd conventional example, and drawing 3 (b) is drawing explaining a color mixture field. as opposed to the aspect ratio of the 1st example in a color mixture field and property B ] [ as opposed to the aspect ratio of the 1st example in property A ]

[Drawing 4] It is the block diagram of Light Emitting Diode lamp concerning the 1st conventional example, and drawing 4 (a) is a side elevation and drawing 4 (b) is the cross section of the orientation of a transverse plane.

[Drawing 5] It is the block diagram of Light Emitting Diode lamp concerning the 2nd conventional example, and drawing 5 (a) is a side elevation and drawing 5 (b) is the cross section of the orientation of a transverse plane.

[An explanation of a sign]

1R The semiconductor light emitting device which emits light in red  
1G The semiconductor light emitting device which emits light in green  
1B The semiconductor light emitting device which emits light in blue

2 Leadframe

3 Golden Wire

4 \*\*\*\* Resin Appearance of Light-Transmission Nature

5R The photogenesis field of semiconductor light-emitting-device 1R

5G The photogenesis field of semiconductor light-emitting-device 1G

6 Color Mixture Field

theta Angle of a color mixture field

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[Translation done.]

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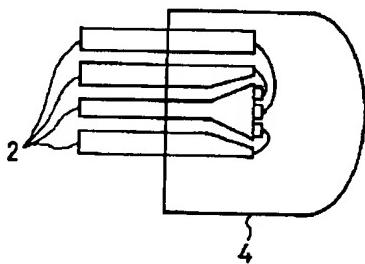
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DRAWINGS

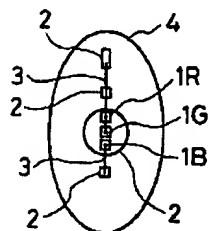
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[ Drawing 2 ]

(a)

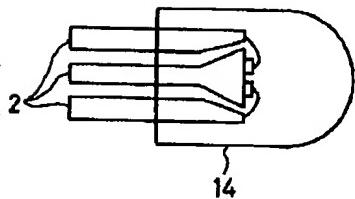


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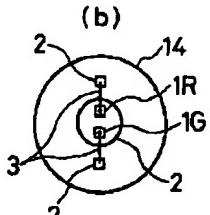


[ Drawing 4 ]

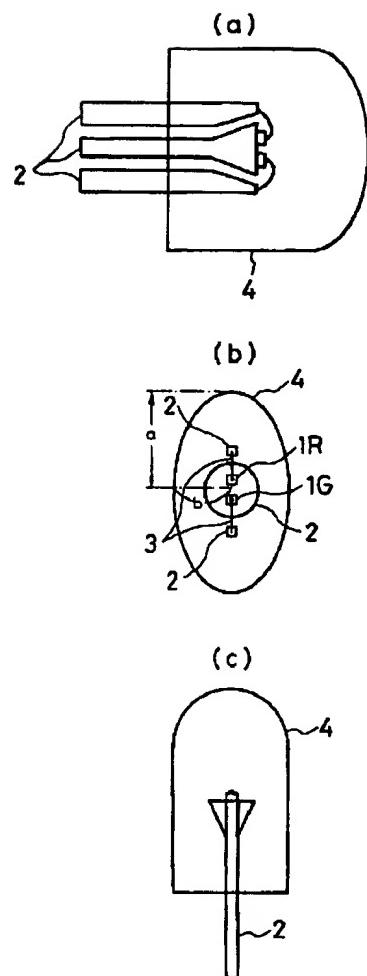
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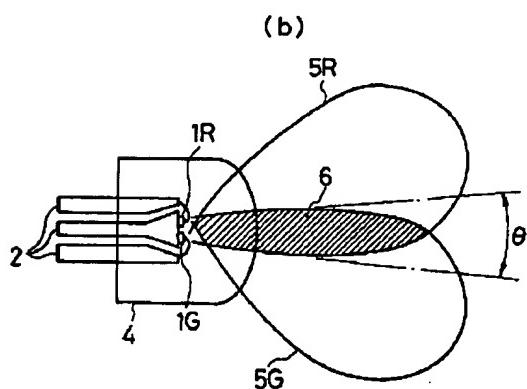
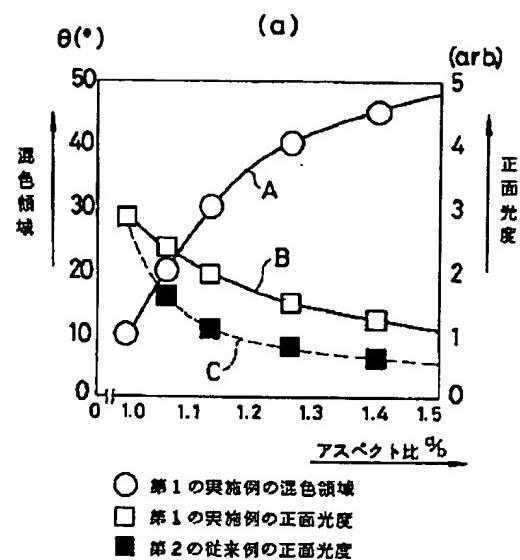
(b)



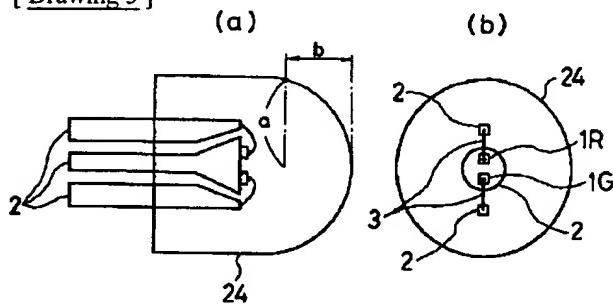
[ Drawing 1 ]



[ Drawing 3 ]



[ Drawing 5 ]



[Translation done.]